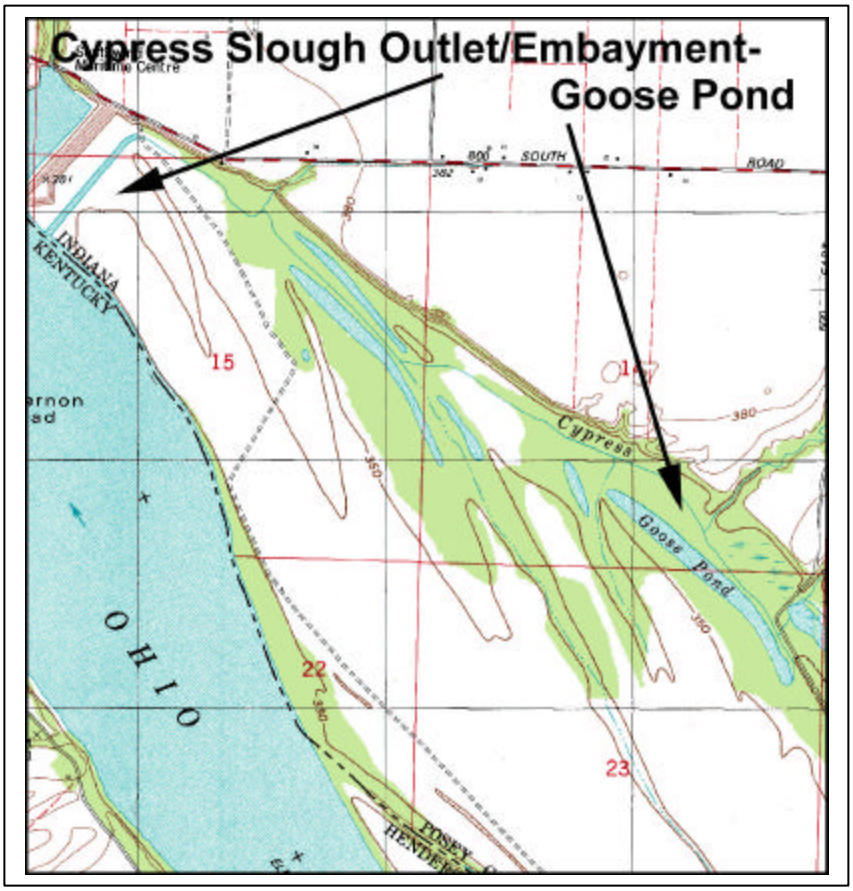
CYPRESS SLOUGH including OUTLET/EMBAYMENT and GOOSE POND (IN-15)

1.0 Location

The proposed Cypress Slough project area, including the Outlet/Embayment and Goose Pond, is located in Posey County, Indiana, and approximately 3 miles southeast of the town of Mt. Vernon, Indiana. The project area is located in the Ohio River floodplain between river miles 820 and 828 near the Ohio River Meyer's Pool. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

The project includes two separate areas: 1) Cypress Slough New Outlet and 2) Goose Pond.



Cypress Slough New Outlet

Aerial View of Goose Pond

2.0 Project Goal, Description, and Rationale

The primary goals of the Cypress Slough-Outlet/Embayment-Goose Pond project include restoration of backwater habitat to enhance the area for fish and wildlife. The restoration of backwater areas will provide reproductive, feeding, nursery, high water refuge, seasonal migration, and overwintering habitat for many fish species.

The project involves dredging 50% of the surface area to an average depth of 12 feet at the USACE normal pool level. Ohio River embayments and sloughs have historically provided important and diverse off-channel habitat for many fish species. Over time many of the embayments and sloughs have silted in and no longer maintain the quality or diversity of habitat previously provided.

New Outlet Embayment is a man made outlet that replaced the original outlet of Cypress Slough that was cut-off during the creation of the Mount Vernon Port Facility. New outlet will be dredged to improve the deep water off channel habitat in the project area.

Goose Pond is a backwater slough area that comprises a portion of the Cypress Slough/Creek system. Goose Pond like many backwater areas provides important spawning, nursery and feeding areas for riverine fishes. Sloughs also provide important habitat for migratory waterfowl, wading birds and other wildlife. Goose Pond is a diverse shallow water slough that is filling in with sediments. The central portions of Goose Pond will be dredged to prolong the life of this habitat and restore the aquatic ecosystem at the site.

3.0 Existing Conditions

Terrestrial/Riparian Habitat: The terrestrial habitats at New Outlet and Goose Pond are different. The habitat at New Outlet is comprised of small trees (e.g. silver maple) and shrubs along the steep banks of the embayment. Bank erosion is common in the area. Adjacent to the banks the area contains agricultural row crops and industrial areas.

New Outlet Bank Vegetation

New Outlet Agriculture

Goose Pond riparian habitat consists of a diverse community surrounding the slough comprised of species tolerant of wet conditions including bald cypress, silver maple, water hickory, pin oak and other species. The area supports a variety of wading birds (e.g. great blue heron) and waterfowl (e.g. wood duck).

Goose Pond Riparian Habitat

Aquatic Habitats: The aquatic habitats within New Outlet Embayment and Goose Pond differ. The New Outlet Embayment habitat resembles a shallow ditch. Water depths within the embayment range from 2 to 5 feet. Habitat diversity is limited and no instream cover is present.

Mouth of New Outlet

New Outlet Embayment

Aquatic habitats within Goose Pond include: 1) a non-vegetated central portion of the slough which maintains sufficient depth that emergent vegetation is not present in this portion of the pond, and 2) shallow water vegetated areas. The shallow near shore areas at the ends of the slough contain dense stands of *Lotus sp.* Bald cypress is also present within Goose Pond. Stumps and fallen trees are also present within Goose Pond, adding to the habitat diversity of the area. There appears to be multiple inlets and outlets at Goose Pond which allows flow throughout the Cypress Slough/Creek system.

Goose Pond

Lotus in Goose Pond

Goose Pond Shoreline

Wetlands: The New Outlet Embayment portion of Cypress Slough contains no wetland areas. Wetland habitat is common, however, throughout the Goose Pond portion of the project area. Wetland species including buttonbush, bald cypress, water hickory, and other species are common in the area. It is likely that the entire Goose Pond floodplain would be considered jurisdictional wetlands.

Bald cypress at Goose Pond

Buttonbush at Goose Pond

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 11 federally-listed endangered species and 1 federally-listed threatened species known to occur in Posey County, Indiana. These species are listed on Table 1.

The riparian corridor adjacent to Goose Pond may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for the Indiana bat.

Bald eagles may utilize forested areas near Goose Pond for roosting/perching habitat and feed in the open water areas. It is unlikely that any eagle nests exist in the project area due to the proximity of the Village of Mount Vernon and agricultural activity.

All of the mussels are freshwater species that typically inhabit medium to large river systems. The mussels are typically found in habitats with substrates that range from silt to gravel, and in water depths from 0.5 to 8.0 meters. These species are generally associated with moderate to fast flowing water. There does not appear to be suitable habitat for these species within the Cypress Slough Embayment/Goose Pond project area.

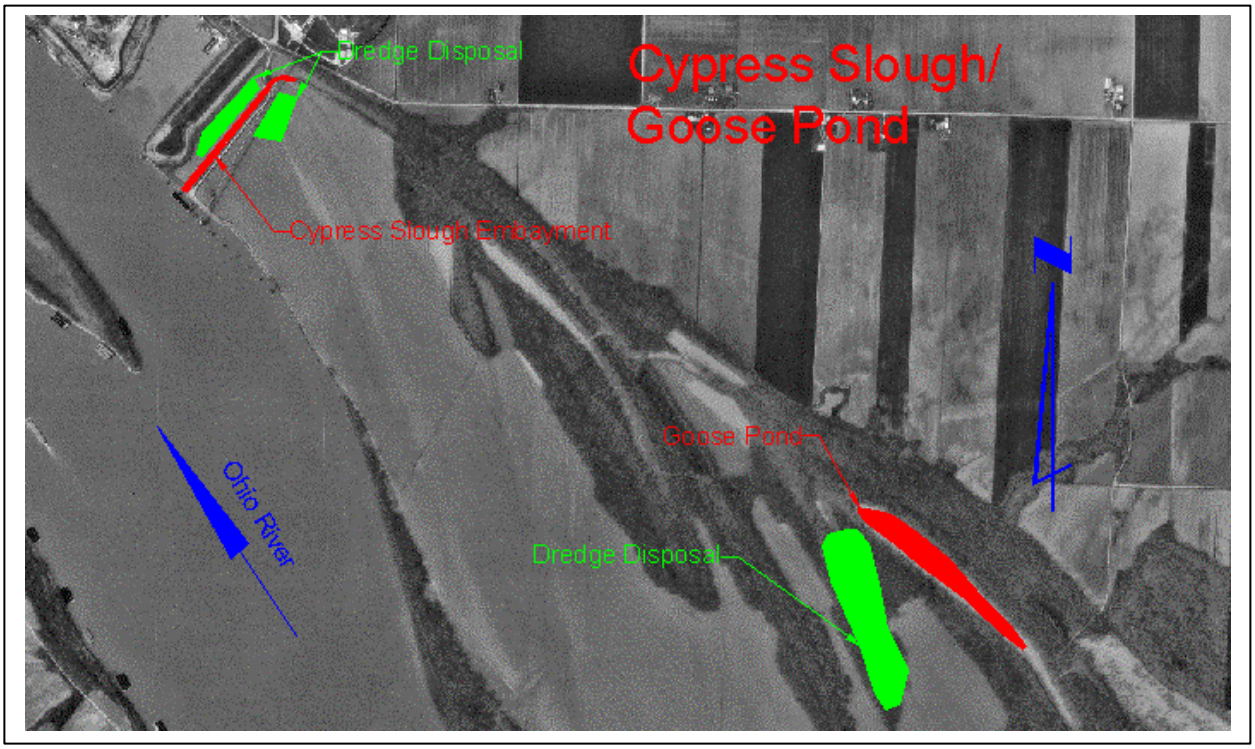
The American burying beetle is generally associated with upland habitats such as grassland prairie, forest edge, and shrubland. It is unlikely that the beetle would be found on the project area.

Table 1. Federally-listed species known to occur in Posey County, Indiana.

Common Name	Scientific Name	Federal Status	Potential Habitat Present
Indiana bat	*Myotis sodalis*	Endangered	Yes
Bald eagle	*Haliaeetus leucocephalis*	Threatened	Yes
Eastern fanshell pearly mussel	*Cyprogenia stegaria*	Endangered	No
Tubercled blossom mussel	*Epioblasma torulosa torulosa*	Endangered	No
Pink mucket pearly mussel	*Lampsilis abrupta*	Endangered	No
Ring pink mussel	*Obovaria retusa*	Endangered	No
White wartyback mussel	*Plethobasus cicatricosus*	Endangered	No
Orange-foot pimpleback mussel	*Plethobasus cooperianus*	Endangered	No
Clubshell mussel	*Pleurobema clava*	Endangered	No
Rough pigtoe mussel	*Pleurobema plenum*	Endangered	No
Fat pocketbook mussel	*Potamilus capax*	Endangered	No
American burying beetle	*Nicrophorus americanus*	Endangered	No

Source: U.S. Fish and Wildlife Service, 1999

4.0 Project Diagram



5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

The project includes two separate areas:

- Cypress Slough New Outlet and
- Goose Pond.

New Outlet Embayment is a man made outlet that replaced the original outlet of Cypress Slough that was cut-off during the creation of the Mount Vernon Port Facility. New Outlet Embayment has filled with sediments due to several factors. These factors include: raised water levels from the impoundment of the Meyer's Pool; deposition of Ohio River silt-laden waters, especially during flood events; wave action from barge traffic; and headwater sediments from the Cypress Slough watershed.

Goose Pond is slowly filling in with sediments. The State of Indiana wishes to protect and restore this unique aquatic ecosystem.

5.2 Cypress Slough New Outlet Embayment Dredging

The dredging will be at a 3:1 slope resulting in an embayment approximately 4 acres in size with a new channel sloping from the shoreline to approximately 12 feet in depth along the centerline of the channel. A land-based dragline dredge will be used instead of the standard river hydraulic dredge system. Dredge spoil will be side cast onto the agricultural fields adjacent to the embayment. A total of 51,750 cubic yards of material would be removed from the existing channel.

5.3 Goose Pond Dredging

Maintenance dredging of Goose Pond is required to prolong the life of this habitat and restore the aquatic ecosystem at the site. The dredging will be at a 10:1 slope resulting in a disturbed area of approximately 10.5 acres. An estimated 96000 cubic yards of silty-clay material would be dredged to restore depths of 9-12 feet in the backwater. A dredge disposal site is adjacent to the embayment, with a natural swale. A small levee, 4 feet high and 600 feet in length, would be constructed at the designated disposal site for dewatering.

5.4 Planning/Engineering Assumptions

Cypress Slough New Outlet Embayment

- A 7 cubic yard dragline dredge would be used, and the material would be side cast directly on the adjacent agricultural fields.
- Bottom side slopes will be reshaped to a 3:1.
- No Finished grading of the banks would be done.
- The disturbed banks of the channel would be seeded

Goose Pond

- A small auger head dredge would be used, and the material would be pumped directly to the disposal site.
- Bottom side slopes will be reshaped to a 10:1.
- All the material required for the levee would be taken from on site.
- A 2,320 gallons per minute (gpm) centrifugal pump would be used for dewatering. Dewatering would commence 18 days after dredging begins to prevent the dewatering basin from exceeding capacity.

6.0 Cost Estimate (Construction)

Dredging – Engineering costs for the proposed project are contained in Table 2. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 2. Engineering Costs.	
Item – New Outlet Embayment	**Cost**
Dredging	$45,700
Clearing	$400
Reseeding	$400
Mobilization	$8,000
SUBTOTAL	**$54,500**
Item- Goose Pond	**Cost**
Dredging	$120,500
Levee	$11,800
Dewatering	$53,000
Mobilization	$15,200
SUBTOTAL	**$200,500**
TOTAL	**$255,000**

7.0 Schedule

Cypress Slough New Outlet Embayment/Goose Pond Dredging: The estimated construction time for this project is shown on Table 3.

Table 3. Construction Schedule.	
Item – New Outlet Embayment	**Time**
Clearing	1 Day
Dredging	32 Days
Reseeding	1 Day
Mobilization	4 Days
SUBTOTAL	**38 Days**
Item- Goose Pond	
Dredging	133 Days
Levee	8 Days
Dewatering	43 Days
Mobilization	4 Days
SUBTOTAL	**188 Days**
TOTAL	**226 Days**

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: The impacts of the Cypress Slough-Goose Pond project would primarily be related to in-stream habitat. There would be no reasonably foreseeable beneficial impacts to terrestrial or riparian resources.

Aquatic Habitats: Long term impacts to aquatic resources would be expected as a result of implementing the proposed project. Dredging of the project areas would result in beneficial impacts to fishes due to the deepened New Outlet Embayment and Goose Pond. The embayment would serve as feeding, nursery, high water refuge, or overwintering habitat for many riverine fish species.

Wetlands: There would be no reasonable foreseeable beneficial impacts to wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no reasonable foreseeable beneficial impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be minor short-term and long-term beneficial impacts to socioeconomic resources as a result of implementing the proposed project. The short-term beneficial impacts would be related to costs and local expenditures associated with the construction/dredging of the embayment. Long-term socioeconomic benefits would be realized through improved recreational fishing opportunities. Long-term indirect beneficial impacts will be realized through local expenditures for fishing tackle, food, gas, and other associated needs.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be short term adverse impacts to terrestrial and riparian species as a result of implementing the proposed project. Construction related noise and activities could result in increased wildlife disturbance near the project area.

Short-term impacts would also occur associated with the disposal of the dredge material on the adjacent agricultural lands. Adverse impacts to this area would be considered short term, because it is assumed that the site can be farmed following the dewatering and grading of the dredge material. Minor impacts associated with creating access to Goose Pond for the dredge unit may occur as some timber clearing maybe required.

Aquatic Habitats: There would be potential short term adverse impacts to sensitive aquatic species as a result of implementing the proposed project. Aquatic species downstream from the project area could be impacted from increased water turbidity due to dredging operations.

Wetlands: No impacts to wetlands will occur at the New Outlet Embayment portion of the project. Adverse impacts to wetlands in the vicinity of Goose Pond may occur. Although the proposed project limits dredging to the portions of Goose Pond away from the shoreline, impacts may occur to some near shore wetland areas as a result of the dredging operations.

Federally-Listed Threatened and Endangered Species: There would be potential for short-term adverse impacts to the bald eagle from construction related noise and disturbance in the vicinity of Goose Pond. These impacts would be minor for the bald eagle, unless nesting areas are nearby, which could create the potential for nest abandonment.

There would be no foreseeable adverse impacts to the Indiana bat as a result of implementing the proposed project.

There would be a slight potential for adverse impacts to the endangered mussel species during the dredging of the project site. Mussels immediately downstream (if any) from the New Outlet Embayment dredge site could be adversely impacted by perturbed water quality conditions associated with displaced sediments.

There are no foreseeable adverse impacts to the American burying beetle as a result of implementing this project.

Socioeconomic Resources: There would be short-term adverse impacts associated with the temporary loss of farming at the dredge material disposal sites. These impacts would be short term because it is assumed that the disposal area can be farmed following the completion of the dredge material dewatering.

10.0 Mitigation

Minor impacts associated with site restoration may occur during the construction of this project, however, no significant adverse impacts are expected. The use of best management practices and proper construction techniques would minimize adverse water quality impacts.

Portions of the bottomland hardwood, scrub shrub, and herbaceous emergent wetlands that populate the Goose Pond area could be impacted during the dredging operations at Goose Pond. Adverse impacts to jurisdictional wetlands may require in-kind mitigation. Mitigation via the creation or enhancement of new wetlands could occur within the Cypress Slough watershed in conjunction with the restoration of the slough.

11.0 Preliminary Operation and Maintenance Costs:

Table 4. Operation and Maintenance Costs		
Maintenance	**Frequency**	**Costs**
Cypress Slough	25 Years	$9,000
Goose Pond	25 Years	$25,000

12.0 Potential Cost Share Sponsor(s)

- USDA-Natural Resources Conservation Service
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- Indiana Department of Natural Resources
- The Nature Conservancy
- Ducks Unlimited
- Indiana Bass Federation
- Local BASS chapters
- Local Government
- County Government
- Local Economic Development Council
- Private Corporations
- Local marinas

13.0 Expected Life of the Project

It is anticipated that the dredging operation would provide meaningful depths for fishes in the area for approximately 25-30 years before additional dredging would be necessary.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings.

The project site consists of a 7.8 mile stretch of Cypress Slough in Posey County, Indiana and the mouth of the slough where it enters the Ohio River at river mile 828. The slough enters the river approximately one mile upstream of the town of Mount Vernon, Indiana.

The following environmental conditions were considered when conducting the project area inspection on June 28 and 30, 1999:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other.

None of the environmental conditions listed above were observed on the project area.

15.0 Property Ownership & River Access

Selected data on properties immediately adjacent to or within each concept site was collected from the county courthouse of the respective county of each site. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area which identified each parcel with a corresponding map and parcel number. The map\parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office. Plat\parcel maps were collected for each site.

The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used in each State for taxation purposes. These assessed values reflect 1998 assessments. The assessed valuation ratio is 33.3 percent for Indiana.

The above ratios were used to approximate the market value of each property. However, in many instances the resultant market value calculated under the above procedure is considerably below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.

The collected property data indicate that private lands are adjacent to the Cypress Slough including New Outlet/Embayment and Goose Pond project area. Private lands will be needed and/or disturbed for this project. The property under consideration is all under private ownership, therefore easements or other agreements will need to be made prior to further progress.

Table 5. Property Characteristics

Site Name: Cypress Slough/Goose Pond
Location: Posey County, Indiana

Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
529/09	Edward/Helen Nurrenbern	C/o Alvin Nurrenbern 6601 Nation Road Mt. Vernon, IN. 47620	$ 41,300	100.00
529/10	Louis Allyn, etal	C/o Allyn Simpson 1900 Greenbrier Drive Mt. Vernon, IN. 47620	$ 9,900	80.00
549/04	Carolyne Nurrenbern, Trustee	8211 Briar Wood Drive Evansville, IN. 47715	$ 20,800	82.00
549/05	Alvin Nurrenbern	(see above)	$ 17,500	73.00
549/06	William Webb	2126 Powhatan Street Falls Church, VA. 22043	$ 200	40.20

* Denotes improvements on property.

16.0 References

Scott, 1989	Scott, M.T. and L.A. Nielson. 1989. Young fish distribution in backwaters and main-channel borders of the Kanawha River, West Virginia. Journal of Fisheries Biology No. 35 (Supplement A) pp. 21-27.
Sheaffer, 1986	Sheaffer, W.A. and J.G. Nickum. 1986. Backwater areas as nursery habitats for fishes in Pool 13 of the Upper Mississippi River. Hydrobiology No. 136 pp. 131-140.
Sheehan, 1994	Sheehan, R.J., W.M. Lewis, and L.R. Bodensteiner. 1994. Winter habitat requirements and overwintering of riverine fishes. Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois. Final Report F-79-R-6.
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Northern States Bald Eagle Recovery Plan. USFWS Denver, Colorado
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Recovery Plan for the Indiana bat (*Myotis sodalis*).
USFWS, 1984	U.S. Fish and Wildlife Service, 1984. Recovery Plan for the Orange-footed Pearly Mussel, Plethobasus cooperianus. Prepared by S. Ahlstedt for USFWS Region 4 August 30, 1984. 46pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1985. Recovery Plan for the Tuberculed-blossom Pearly Mussel, *Epioblasma torulosa torulosa*, Turgid-blossom Pearly Mussel, *Epioblasma turgidula*, Yellow-blossom Pearly Mussel, *Epioblama florentina florentina*. USFWS Atlanta, Georgia. 42pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1996. Recovery plan for the pink mucket pearly mussel. USFWS Atlanta, Georgia.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Recovery Plan for Ring Pink Mussel (*Obovaria retusa*). Prepared by R.G. Biggins for the Southeast Region USFWS February, 1991. 24pp.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Fanshell Recovery Plan. Prepared by R.G. Biggins for the Southeast Region USFWS July 9, 1991. 37pp.
USFWS, 1994	Recovery Plan for the Clubshell (*Pleurobema clava*), Northern Riffleshell (*Epioblasma torulosa rangiana*). Prepared by G.T. Watters for USFWS Region 5, Hadley, Massachusetts. 57pp.
USFWS, 1997	U.S. Fish and Wildlife Service, 1997. Species Accounts: pink mucket pearly mussel (*Lampsilis abrupta*).
USFWS, 1999	U.S. Fish and Wildlife Service, July 1, 1999. Federally Listed Endangered and Threatened Species in Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist

Project Site Location:

The proposed Cypress Slough project area, including the Outlet/Embayment and Goose Pond, is located in Posey County, Indiana, and approximately 3 miles southeast of the town of Mt. Vernon, Indiana. The project area is located in the Ohio River floodplain between river miles 820 and 828 near the Ohio River Meyer's Pool. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE). The project includes two separate areas: 1) Cypress Slough New Outlet and 2) Goose Pond.

Description of Plan selected:

The primary goals of the Cypress Slough-Outlet/Embayment-Goose Pond project include restoration of backwater habitat to enhance the area for fish and wildlife. The restoration of backwater areas will provide reproductive, feeding, nursery, high water refuge, seasonal migration, and overwintering habitat for many fish species. The project involves dredging 50% of the surface area to an average depth of 12 feet at the USACE normal pool level. The project includes two separate areas: 1) Cypress Slough New Outlet and 2) Goose Pond.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? **Yes** and description

Reduce the amount of dredging.

Larger Size Plan Possible? **Yes** and description

Increase the amount of dredging.

Other alternatives? **No**

Restore/Enhance/Protect Terrestrial Habitats? No **Objective numbers met**

Restore, Enhance, & Protect Wetlands? No **Objective numbers met**

Restore/Enhance/Protect Aquatic Habitats? Yes **Objective numbers met** A1

Type species benefited: Multiple species of Ohio River fishes.

Endangered species benefited: None

Can estimated amount of habitat units be determined: Approximately 4 acres of embayment and 10.5 acres of slough habitat (14.5 acres total) will be restored.

Plan acceptable to Resources Agencies?

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Yes – Indiana DNR

Plan considered complete? **Connected to other plans for restoration?**

Real Estate owned by State Agency? No **Federal Agency?** No
Real Estate privately owned? Yes
If privately owned, what is status of future acquisition Acquisition, agreements, or easements will be required.

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

Restoration provides valuable fish habitat in the form of increased habitat diversity, spawning habitat, over-wintering habitat, and deep water winter velocity shelters.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?
Yes / No
Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____
Non-government Entity _____

Corps Contractor _____Date_____

U.S. Fish & Wildlife Representative _____Date_____

State Agency Representative _____Date _____

U.S. Army Corps of Engineers Representative _____Date _____

Terrestrial Habitat Objectives

T1 Riparian Corridors

T2 Islands

T3 Floodplains

T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

W1 Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands

W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)

A2 Riverine submerged and aquatic vegetation

A3 Sand and gravel bars

A4 Riffles/Runs (tailwaters)

A5 Pools (deep water, slow velocity, soft substrate)

A6 Side Channel/Back Channel Habitat

A7 Fish Passage

A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)